



MISSOURI
Mathematics Grade-Level Expectations Grade 9
MathMatters 1 © 2006

| OBJECTIVES | PAGE REFERENCES |
|---|--|
| Number and Operations | |
| 1. Understand numbers, ways of representing numbers, relationships among numbers and number systems | |
| A. Read, write and compare numbers | |
| compare and order rational and irrational numbers, including finding their approximate locations on a number line MA 5 3.3 IX.a | SE: 101 #4, 103 #19-#30, 112 #60-#65, 118 #2, 206 #15-#20, 240 #1-#2, 536 #7-#12 ATE: GS 104 I 118 TT 207 |
| B. Represent and use rational numbers | |
| C. Compose and decompose numbers | |
| D. Classify and describe numeric relationships | |
| 2. Understand meanings of operations and how they relate to one another | |
| A. Represent operations | |
| B. Describe effects of operations | |
| describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities MA 4 3.4,4.1 VIII.i | SE: 108-111, 112 #36-#65, 132-135 ATE: ETL 109, 137 GS 142 QA 110, 144 TT 108, 134 |
| C. Apply properties of operations | |
| apply properties of exponents (including order of operations) to simplify expressions MA 4 1.6,1.10 VIII.c & d | SE: 132-135, 136-139, 140 #33-#72, 141 #113-#136 ATE: DI 136 GS 132, 136 QA 135, 138 TT 134 |
| D. Apply operations on real and complex numbers | |
| apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases MA 1,4,5 1.4,3.4 V.a, VIII.d, IX.6 | SE: 104-107, 108-111, 112 #1-#24, 113 #67-#84, 114-117, 122 #1-#27, 123 #60-#77, 146 #11-#22 ATE: GS 108, 114 |

| OBJECTIVES | PAGE REFERENCES |
|--|---|
| 3. Compute fluently and make reasonable estimates | |
| A. Describe or represent mental strategies | |
| B. Develop and demonstrate fluency | |
| C. Compute problems | |
| apply all operations on real numbers MA 5 1.10,3.3 IX.a | SE: 104-107, 108-111, 112 #1-#24, 113 #67-#84, 114-117, 122 #1-#27, 123 #60-#77, 146 #11-#22 ATE: GS 108, 114 |
| D. Estimate and justify solutions | |
| judge the reasonableness of numerical computations and their results MA 1 3.8 V.a | SE: 502-503, 504 #8-#12, 505 #18, 512 #28-#30 ATE: ETL 503 QA 503 |
| E. Use proportional reasoning | |
| solve problems involving proportions MA 1,4 3.3 V.a, VIII.e | SE: 84-87, 260-263, 268 #1-#24, 269 #55-#66, 296 #11-#16 ATE: AA 85 DI 84, 261 QA 86, 262 |
| Algebraic Relationships | |
| 1. Understand patterns, relations and functions | |
| A. Recognize and extend patterns | |
| B. Create and analyze patterns | |
| generalize patterns using explicitly or recursively defined functions MA 4 1.6,3.5 VIII.1.b | SE: 128-129, 130 #36-#44, 131 #61-#62, 141 #93-#94, 147 #49-#51, 151 #19 ATE: ETL 129 GS 128 QA 129 TT 128 |
| C. Classify objects and representations | |
| compare and contrast various forms of representations of patterns MA 4 1.6 VIII.a & h | SE: 128-129, 130 #36-#44, 131 #61-#62, 141 #93-#94, 147 #49-#51, 151 #19 ATE: ETL 129 GS 128 QA 129 TT 128 |
| D. Identify and compare functions | |
| understand and compare the properties of linear and exponential functions (include intercepts) MA 4 1.6,3.6 VIII.b & c | SE: 318-321, 322 #28-#51, 323 #63-#68, 333 #46-#48, 338-341, 343 #24-#28, 347 #18 |
| E. Describe the effects of parameter changes | |
| describe the effects of parameter changes on linear functions MA 4 1.6,4.1 VIII.i | SE: 331 #33-#35, 343 #24-#28 ATE: ETL 341 |

| OBJECTIVES | PAGE REFERENCES |
|---|---|
| 2. Represent and analyze mathematical situations and structures using algebraic symbols | |
| A. Represent mathematical situations | |
| use symbolic algebra to represent and solve problems that involve linear relationships, including absolute value and recursive relationships MA 4,6 1.6,3.1 VIII.c & d, X.h | SE: 212-215, 216 #37-#63, 218-221, 222-225, 251 #29-#37, 253 #4-#15, 338-341 ATE: ETL 213, 341 QA 220 |
| B. Describe and use mathematical manipulation | |
| describe and use algebraic manipulations, including factoring and rules of integer exponents MA 4 3.1,4.1 VIII.a & d | SE: 136-139, 140 #33-#72, 414-417, 422 #13-#27, 423 #62-#67 ATE: AA 417 DI 415 ETL 416 TT 414 |
| C. Utilize equivalent forms | |
| use and solve equivalent forms of equations and inequalities (linear) MA 4 1.6,3.4 VIII.d & e | SE: 212-215, 216 #37-#63, 218-221, 222-225, 246-249, 252 #88-#90 ATE: ETL 213 QA 214, 220 TT 247 |
| D. Utilize systems | |
| use and solve systems of linear equations with 2 variables MA 4 1.6 VIII.b & d | This objective can be found in Glencoe's <i>MathMatters 2</i> © 2006 in chapter 8, lesson 2 (pages 338-341), chapter 8, lesson 3 (pages 344-347) and chapter 8, lesson 4 (pages 348-351). |
| 3. Use mathematical models to represent and understand quantitative relationships | |
| A. Use mathematical models | |
| identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem MA 4 1.6,3.6 VIII.c | SE: 321 #33-#34, 331 #26-#30, 333 #1-#6, 340 #12, 347 #21 |
| 4. Analyze change in various contexts | |
| A. Analyze change | |
| analyze linear functions by investigating rates of change and intercepts MA 4 1.6,4.1 VIII.a & c | SE: 319 ex 3, 320 #25-#30, 321 #35, 322 #40-#51, 324-327, 328 ex 1, 331 #26-#27 ATE: AA 325 ETL 326 QA 326 |
| Geometric and Spatial Relationships | |
| 1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships | |
| A. Describe and use geometric relationships | |
| solve problems involving angle relationships (supplementary, complementary angles) and Pythagorean Theorem MA 2 1.6 VI.c | SE: 305 #37-#39, 334-337, 344 #34-#36, 345 #26, 346 #11, 347 #19, 352 ex 1, 354 #24 ATE: ETL 335 QA 336 |

| OBJECTIVES | PAGE REFERENCES |
|--|--|
| B. Apply geometric relationships | |
| apply geometric properties and relationships, such as similarity, to solve multi-step problems in 2 dimensions MA 2 3.6 VI.c | SE: 62-65, 66-69, 70 #19-#34, 71 #45-#52, 95 #22-#35 ATE: AA 62 ETL 63, 66 QA 64, 68 |
| C. Compose and decompose shapes | |
| 2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems | |
| A. Use coordinate systems | |
| solve problems related to 2-dimensional objects by finding the distance on a Cartesian plane MA 2 3.2 VI.f | SE: 335 ex 2, 336 #25-#34, 337 #41-#42, 344 #35, 345 #24, 346 #11, 347 #19, 572 #10-#18 ATE: CE 335 ex 3 |
| 3. Apply transformations and use symmetry to analyze mathematical situations | |
| A. Use transformations on objects | |
| represent translations, reflections, rotations, and dilations of objects in the coordinate plane MA 2 1.10 VI.b | SE: 370-373, 374 ex 1, 375 ex 2, 376 #14-#15, 378 #9-#26, 379 #37-#38 ATE: AA 374 QA 372 TT 370, 371 |
| B. Use transformations on functions | |
| translate and reflect linear functions MA 4 3.1 VIII,I | This objective can be found in Glencoe's <i>Advanced Mathematical Concepts: Precalculus with Applications</i> © 2004 in chapter 3, lesson 2 (pages 137-145). |
| C. Use symmetry | |
| 4. Use visualization, spatial reasoning and geometric modeling to solve problems | |
| A. Recognize and draw three-dimensional representations | |
| draw and use vertex-edge graphs or networks to find optimal solutions MA 6 3.4 X.a | ATE: AA 363 |
| B. Draw and use visual models | |
| draw or use visual models to represent and solve problems MA 2 3.1 VI.b & i | SE: 170-171, 366-367, 368 #10-#14, 369 #23-#24, 379 #36, 385 #30-#32, 477 #15-#16 ATE: CE 367 ETL 366 QA 367 |
| Measurement | |
| 1. Understand measurable attributes of objects and the units, systems and processes of measurement | |
| A. Determine unit of measurement | |
| identify and justify appropriate units of measure for velocity MA 1,2 3.1,4.1 V.a, VI.d | SE: 302-303, 311 #49, 316 #11, 327 #41 |

| OBJECTIVES | PAGE REFERENCES |
|---|--|
| B. Identify equivalent measures | |
| C. Tell and use units of time | |
| D. Count and compute money | |
| 2. Apply appropriate techniques, tools and formulas to determine measurements | |
| A. Use standard or non-standard measurement | |
| B. Use angle measurement | |
| solve problems of angle measure, including those involving triangles or other polygons MA 2 3.1,3.4 VI.i | SE: 363 ex 2-ex 3, 364 #6-#8, 365 #27-#29, 368 #1-#9, 369 #22, 379 #35, 385 #28-#29, 387 #15-#16, 389 #19 ATE: QA 364 |
| C. Apply geometric measurements | |
| determine the surface area and volume of geometric figures, including cones, spheres, and cylinders MA 2 1.10,3.4 VI. i | SE: 184-187, 188-191, 192 #7-#12, 193 #62, 194-197, 200 #39-#50, 201 #27-#28 ATE: AA 185 QA 186, 196 |
| D. Analyze precision | |
| analyze effects of computation on precision MA 2 1.7,3.8 VI.k | SE: 52 ex 1, 53 #1-#3, 54 #12-#17, 60 #1-#6, 94 #11, 97 #1 |
| E. Use relationships within a measurement system | |
| use unit analysis to solve problems involving rates MA 4 3.1 VIII.b | SE: 50 #7-#14 |
| Data and Probability | |
| 1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them | |
| A. Formulate questions | |
| formulate questions, design studies, and collect data about a characteristic MA 3 1.2 VII.a | SE: 6-9, 14 #1-#7, 15 #27-#31 <i>Chapter Investigation 3, 44</i> ATE: CI 3 DI 6 ETL 7, 30 QA 8 |
| B. Classify and organize data | |
| C. Represent and interpret data | |
| select, create, and use appropriate graphical representation of data MA 6 1.8, 3.6 X.b | SE: 16-19, 20-21, 22 #1-#9, 23 #28-#29, 24-27, 28-31, 34-37, 38-41 ATE: ETL 16 GS 16 QA 18 |
| 2. Select and use appropriate statistical methods to analyze data | |
| A. Describe and analyze data | |
| apply statistical concepts to solve problems MA 3 1.10,3.4 VII.g | SE: 10-13, 14 #8-#26, 19 #42, 23 #24-#27, 33 #22, 43 #16-#22, 45 #14-#15 ATE: ETL 10, 11 QA 12 |

| OBJECTIVES | PAGE REFERENCES |
|---|--|
| B. Compare data representations | |
| given one-variable quantitative data, display the distribution and describe its shape MA 3 1.8 VII.d & I | This objective can be found in Glencoe's <i>MathMatters 3</i> © 2006 in chapter 8, lesson 7 (pages 412-415). |
| C. Represent data algebraically | |
| given a scatterplot, determine an equation for a line of best fit MA 3 1.6 VII.b | SE: 34-37, 44 #35-#40, 83 #44-#46, 340 ex 3 ATE: ETL 35 GS 34 QA 36 |
| 3. Develop and evaluate inferences and predictions that are based on data | |
| A. Develop and evaluate inferences | |
| make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatterplots of the data and approximate lines of fit | SE: 34-37, 44 #35-#40, 83 #44-#46, 340 ex 3 ATE: ETL 35 GS 34 QA 36 |
| B. Analyze basic statistical techniques | |
| 4. Understand and apply basic concepts of probability | |
| A. Apply basic concepts of probability | |
| construct sample spaces and distributions MA 3 3.1 VII.f | SE: 446-449, 454 #1-#8, 455 #33-#34, 463 #52-#53, 469 #29-#30, 471 #10-#11 ATE: GS 446 QA 448 TT 446, 447 |
| B. Use and describe compound events | |

Codes Used for ATE Pages

| | |
|-----|----------------------------|
| AA | Alternative Assessment |
| CE | Chalkboard Examples |
| CI | Chapter Investigation |
| DI | Differentiated Instruction |
| ETL | Extend the Lesson |
| GS | Getting Started |
| I | Introduction |
| QA | Quick Assessment |
| TT | Teaching Tip |